



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,083	09/19/2003	Boris Prokopenko	252209-2100	8438

24504 7590 05/03/2007  
THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP  
100 GALLERIA PARKWAY, NW  
STE 1750  
ATLANTA, GA 30339-5948

EXAMINER

GEIB, BENJAMIN P

ART UNIT	PAPER NUMBER
----------	--------------

2181

MAIL DATE	DELIVERY MODE
-----------	---------------

05/03/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/666,083

Applicant(s)

PROKOPENKO ET AL.

Examiner

Benjamin P. Geib

Art Unit

2181

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7,9-22 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-22 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Claims 1-7, 9-22, and 25 have been examined.
2. It is hereby acknowledged that the following papers have been received and placed of record in the file: request for continued examination received on 02/14/2007.
3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/14/2007 has been entered.

### ***Allowable Subject Matter***

4. Claims 1-7, 9-11, 19-22, and 25 would be allowable if rewritten or amended to overcome the objections and rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.
5. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record including the disclosures of Bratt et al. (U.S. Patent No. 6,877,020), Jung et al. (U.S. Patent No. 6,804,771), Saulsbury et al. (U.S. Patent Application Publication No. 2002/0032710), and Hanounik et al. ("Linear-time Matrix Transpose Algorithms Using Vector Register File With Diagonal

Art Unit: 2181

Registers”) neither anticipates nor renders obvious the following limitations of claim 1 (in combination with all other features in the claim):

“wherein the controller is comprised of:

address lines configured to identify a proper component register of each respective register bank, wherein the address lines are provided by outputs of multiplexers configured to receive inputs from an up counter and a down counter located within the controller; and

control bits configured to control operation of the multiplexer stages within the input rotator and the output rotator, wherein the control bits are provided by outputs from the up counter.”.

Claims 2-7 and 9-11 depend from claim 1 and are considered allowable for at least the reasons noted above with respect to claim 1.

The prior art of record including the disclosures cited above neither anticipates nor renders obvious the following limitations of claim 18 (in combination with all other features in the claim):

“wherein the input rotation means and the output rotation means are communicably coupled to the controller means through control signals, wherein the control signals between the controller means and input rotation means are the same control signals as the control signals between the controller means and the output rotation means, and wherein the controller means is comprised of:

Art Unit: 2181

address lines configured to identify a proper component register of each respective register bank, wherein the address lines are provided by outputs of multiplexers configured to receive inputs from an up counter and a down counter located within the controller; and

control bits configured to control operation of the multiplexer stages within the input rotator and the output rotator, wherein the control bits are provided by outputs from the up counter.”:

Claims 19-22 and 25 depend from claim 18 and are considered allowable for at least the reasons noted above with respect to claim 18.

### ***Claim Objections***

6. Claims 1-7, 9-22, and 25 are objected to because of the following informalities:

Regarding claim 1,

at line 8, “the components” should be changed to --each set of corresponding components—

at lines 9-10, “the rotated set of corresponding components” should be changed to --a rotated set of corresponding components—

at line 13, “a vector an amount” should be changed to --a vector by an amount--

Art Unit: 2181

at line 16, "a controller configured to control the addressing" should be changed to --a controller configured to control addressing—

at line 18, "to control the addressing" should be changed to --to control addressing—

at line 23, "to identify the proper component register" should be changed to --to identify a proper component register—

at line 27, "to control the operation" should be changed to --to control operation—

Regarding claim 4,

at line 2, "for storing the vector components" should be changed to --for storing vector components—

Regarding claim 7,

at line 2, "the vector components" should be changed to --vector components—

Regarding claim 9,

at line 1, "the vector" should be changed to --each vector—

Regarding claim 11,

at line 2, "the vector component" should be changed to --each vector component—

Regarding claim 12,

at line 7, "the corresponding component" should be changed to --the set of corresponding components—

Regarding claim 16,

Art Unit: 2181

at line 2, "the vector" should be changed to —each vector—

Regarding claim 18,

at lines 7-8, "the corresponding components" should be changed to —each set of corresponding components—

at lines 9-10, "the rotated set of corresponding components" should be changed to —each rotated set of corresponding components—

at lines 17-18, "for controlling the writing and reading of the vector components" should be changed "for controlling writing and reading of vector components"

at line 18, "rotation of the vector components" should be changed to --rotation of vector components—

at lines 21-24, "wherein the input rotator means and the output rotator means are communicably coupled to the controller means through control signals, wherein the control signals between the controller and input rotator means are the same control signals between the controller and the output rotator means" should be changed to —wherein the input rotation means and the output rotation means are communicably coupled to the controller means through control signals, wherein the control signals between the controller means and input rotation means are the same control signals as the control signals between the controller means and the output rotation means—

at line 26, "identify the proper component" should be changed to —identify a proper component—

Art Unit: 2181

at line 30, "control the operation" should be changed to –control  
operation—

Regarding claim

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-7, 9-22, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Referring to claim 1, the claim recites the limitation "an output rotator coupled to the bank of register files, for receiving and rotating the components of a vector an amount that depends on the time slot of the vector to generate a vector having a time parallel format, wherein the output rotator is comprised of a plurality of multiplexer stages for rotating the components", which renders the claim indefinite. Since there is a plurality of vectors and a plurality of components of vectors previously within the claim, it is unclear which vectors are rotated and which vectors are generated. The above-cited limitation will be interpreted as "an output rotator coupled to the bank of register files, for receiving and rotating the components of a vector by an amount that depends on the time slot of the vector in time parallel format to generate the vector in time parallel format, wherein the output rotator is comprised of a plurality of multiplexer stages



Art Unit: 2181

for rotating the components of each vector" for the remainder of the examination as it appears to be what the applicant intended.

10. Regarding claim 12, the claim recites the limitation "rotating the collected components of the vector an amount that depends on the time slot of the vector to generate a vector in time parallel format" which renders the claim indefinite.

Since there is no previous mention of the vectors having a time slot, there is insufficient antecedent basis for the limitation in the claim. Since the claim does previously state that each vector in time parallel format has a time slot, the above-cited limitation will be interpreted as "rotating the collected components of the vector an amount that depends on the time slot of the vector in time parallel format to generate the vector in time parallel format" for the remainder of the examination as it appears to be what the applicant intended.

11. Regarding claims 13, 14 and 20, the claims recite the limitation "the vector components", which renders the claims indefinite. Since there is a plurality of vectors and vector components previously mentioned in the claims, it is unclear which vector components are being referred to. The limitation "the vector components" will be interpreted as "vector components" for the remainder of the examination as it appears to be what the applicant intended.

12. Regarding claim 18, the claim recites the limitation "wherein the output rotation means is comprised of a plurality of multiplexing means for rotating the corresponding components", which renders the claim indefinite. Since there is a plurality of corresponding components previously mentioned in the claims, it is unclear which corresponding components are being referred to. The limitation

Art Unit: 2181

will be interpreted as "wherein the output rotation means is comprised of a plurality of multiplexing means for rotating the components of each vector" for the remainder of the examination as it appear to be what the applicant intended.

***Claim Rejections - 35 USC § 102***

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 12-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Bratt et al., U.S. Patent No. 6,877,020 (Hereinafter Bratt).

15. Referring to claim 12, Bratt has taught a method for converting a group of vectors from a time serial to a time parallel format, wherein in the time serial format, sets of corresponding components of the vectors each have a time slot, and in time parallel format, each vector has a time slot, the method comprising:

for each set of corresponding components,

rotating the corresponding components an amount that depends on the time slot of the set of corresponding components, wherein the amount is designated by control signals provided by outputs from an up counter

located within a controller *[Each row of elements is rotated by an amount the depends on the row number (See Fig. 75, component 9511; column 50, lines 56-62). As can be seen in Fig. 75, the amount each row is rotated in operation 9511 increases by one for each subsequent row (i.e. the amount is zero for row 0 and increases to seven for row 7). Therefore, the circuitry within the processor that provides the control signals counts up and is an up counter];*

writing each set of rotated corresponding components in a separate set of registers *[look up table]* in a bank of register files *[look up unit; column 50, line 62 – column 51, line 4] [column 51, lines 9-34];* and for each vector in the group,

reading selected registers in the bank to collect the components of the vector *[column 51, lines 9-34];* and

rotating the collected components of the vector an amount that depends on the time slot of the vector in time parallel format to generate the vector in time parallel format, wherein the amount is designated by the same control signals used for rotating each set of corresponding components *[Each vector is rotated by an amount that depends on the row number (See Fig. 75, component 9515; column 51, lines 5-8). As can be seen in Fig. 75, the amount each row is rotated in operation 9511 and the amount each row is rotated in operation 9515 is the same. Therefore, the amount is designated by the same control signals (i.e. zero for row 0 and seven for row 7)];*

Art Unit: 2181

wherein writing each set of corresponding components and reading the vector components is performed either horizontally or vertically, in alternating fashion [*The controller alternates between horizontal and vertical read/writing to reposition elements within columns (See Fig. 75, component 9513; column 50, line 62 – column 51, line 4 & column 51, lines 19-34)*].

16. Referring to claim 13, Bratt has taught the method of claim 12, wherein if vector components are written horizontally to the bank of register files (*i.e. each component of the vector is written into a different column and, therefore, the vector flows horizontally*), then the vector components are read horizontally (*i.e. from all different columns*) from the bank of register files [*When a vector is written into the look up table so that the vector flows horizontally, the vector still flows horizontally when it is read out (See Fig. 75, component 9532; column 50, line 59 – column 51, line 4)*].

17. Referring to claim 14, Bratt has taught the method of claim 12, wherein if vector components are written vertically to the bank of register files (*i.e. each component of the vector is written into a different row and, therefore, the vector flows vertically*), then the vector components are read vertically (*i.e. from all different rows*) from the bank of register files [*When a vector is written into the look up table so that the vector flows vertically, the vector still flows vertically when it is read out (See Fig. 75, component 9532; column 50, line 59 – column 51, line 4)*].

18. Referring to claim 15, Bratt has taught the method of claim 12, wherein a set of corresponding components is written and the components of a vector are

Art Unit: 2181

read in the same clock cycle *[A set of corresponding components, which is also a vector, is read from vector register va0 and written to the look up unit during cycle C1 (See cycle C1; column 53, lines 8-22, 26-28)].*

19. Referring to claim 16, Bratt has taught the method of claim 12,

wherein each vector has n (8) components; and

wherein n sets of corresponding components are horizontally written over n clock cycles and vectors are horizontally read over the same n clock cycles *[8 sets of corresponding components, which are also 8 vectors, are read from vector registers va0-v<sub>a</sub>7 and are written to the look up unit over the same 8 cycles. Since the vectors are written to the look up unit with each component in a different column (i.e. horizontal flow), the reads and writes are horizontal. (See cycles C1-C8; column 53, lines 8-22, 26-49)].*

20. Referring to claim 17, Blomgren has taught the method of claim 16,

wherein in another n clock cycles (cycles C9-C16; column 53, line 50 – column 54, line 5) subsequent to the n clock cycles (cycles C1-C8; column 53, lines 26-49), n sets of corresponding components are vertically written over n clock cycles and vectors are vertically read over the same n clock cycles *[8 sets of corresponding components, which are also 8 vectors, are read from the look up unit and are written to vector registers va0-v<sub>a</sub>7 over the same 8 cycles. Since the vectors are read from the look up unit with each component in a different row (i.e. vertical flow), the reads and writes are vertical. (See cycles C9-C16; column 53, lines 8-22 & column 53, line 50 – column 54, line 5)].*

### ***Response to Arguments***

21. Applicant's arguments filed 02/14/2007 regarding claims 12-17 have been fully considered but they are not persuasive.

22. Applicant argues the novelty/rejection of claims 12-17 on pages 14-16 of the remarks, in substance that:

"Bratt does not teach the feature wherein the amount of rotation of both the 'corresponding components' and 'collected component' are controlled by the same control signals" (page 15)

These arguments are not found persuasive for the following reasons:

Bratt has taught that the amount each row is rotated in operation 9511 and the amount each row is rotated in operation 9515 is the same (See Fig. 75).

That is, Bratt has taught that rows va0 and va7 (i.e. sets of corresponding components) are rotated by zero and seven, respectively, just as rows vc0 and vc7 (i.e. sets of collected components) are rotated by zero and seven, respectively. Therefore, the amount is designated by the same control signals (i.e. zero for row 0 and seven for row 7).

### ***Conclusion***

23. The following is text cited from 37 CFR 1.111(c): In amending in reply to a rejection of claims in an application or patent under reexamination, the applicant or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the

Art Unit: 2181

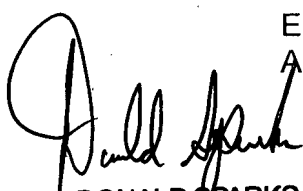
references cited or the objections made. The applicant or patent owner must also show how the amendments avoid such references or objections.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin P. Geib whose telephone number is (571) 272-8628. The examiner can normally be reached on Mon-Fri 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Benjamin P Geib  
Examiner  
Art Unit 2181



**DONALD SPARKS**  
**SUPERVISORY PATENT EXAMINER**